

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

CLAIMS

1 1. A magnetic head comprising:
2 a read head structure having a first magnetic shield, a second magnetic shield, and a
3 sensor disposed therebetween, wherein gap insulation layers are disposed between each magnetic
4 shield and the sensor, and wherein at least one of said gap insulation layers includes multilayer
5 laminations of insulation material.

1 2. A magnetic head as recited in claim 1, wherein each lamination is formed of an
2 oxide of a metal selected from the group consisting of aluminum, silicon, chromium and
3 tantalum.

1 3. A magnetic head as recited in claim 1, wherein each lamination is formed of a
2 nitride of a metal selected from the group consisting of aluminum, silicon, chromium and
3 tantalum.

1 4. A magnetic head as recited in claim 1, wherein the multilayer laminated structure
2 is composed of approximately 5-10 laminations.

1 5. A magnetic head as recited in claim 4, wherein the thickness of each lamination is
2 approximately 10 Å to 50 Å.

1 6. A magnetic head as recited in claim 5, wherein the preferred thickness of each
2 lamination is approximately 10 Å to 20 Å.

1 7. A magnetic head as recited in claim 1, wherein the spacing between the first
2 magnetic shield layer and a portion of the second magnetic shield layer, said second magnetic
3 shield portion being located proximate to the sensor portion of the head, is approximately 1000
4 Å.

1 8. A magnetic head as recited in claim 7, wherein the spacing between the first
2 magnetic shield and the sensor is approximately 50 Å - 500 Å.

1 9. A magnetic head as recited in claim 7, wherein the spacing between the sensor
2 and the portion of the second magnetic shield layer located proximate to the sensor is
3 approximately 50 Å - 500 Å.

1 10. A magnetic head as recited in claim 1, wherein the spacing between the sensor
2 and the portion of the second magnetic shield layer located proximate to the sensor is
3 approximately 250 Å.

1 11. A hard disk drive comprising:
2 a motor for rotating a spindle;
3 a thin film magnetic disk mounted on the spindle; and
4 an actuator assembly having a magnetic head mounted thereon wherein said magnetic
5 head includes:

6 a read head structure having a first magnetic shield, a second magnetic shield, and a
7 sensor disposed therebetween, wherein gap insulation layers are disposed between each magnetic

8 shield and the sensor, and, wherein at least one of said gap insulation layers includes multilayer
9 laminations of insulation material.

1 12. The disk drive as recited in claim 11, wherein each lamination is formed of an
2 oxide of a metal selected from the group consisting of aluminum, silicon, chromium, and
3 tantalum.

1 13. The disk drive as recited in claim 11, wherein each lamination is formed of a
2 nitride of a metal selected from the group consisting of aluminum, silicon, chromium and
3 tantalum.

1 14. The disk drive as recited in claim 11, wherein the multilayer laminated structure is
2 composed of approximately 5-10 laminations.

1 15. The disk drive as recited in claim 14, wherein the thickness of each lamination is
2 in the range of 10 Å to 50 Å.

1 16. The disk drive as recited in claim 15, wherein the preferred thickness of each
2 lamination is in the range of 10 Å to 20 Å.

1 17. The disk drive as recited in claim 11, wherein the spacing between the first
2 magnetic shield layer and a portion of the second magnetic shield layer located proximate to the
3 sensor is approximately 1000 Å.

1 18. The disk drive as recited in claim 17, wherein the spacing between the first
2 magnetic shield and the sensor is approximately 50 Å to 500 Å.

1 19. The disk drive as recited in claim 17, wherein the spacing between the sensor and
2 the portion of the second magnetic shield located proximate to the sensor is approximately 50 Å
3 to 500 Å.

1 20. The disk drive as recited in claim 11, wherein the spacing between the sensor and
2 the portion of the second magnetic shield layer located proximate to the sensor is preferably 250
3 Å.

1 21. A method of fabricating a gap insulation layer upon a substrate layer in a read
2 head, including the steps of:

- 3 a. depositing a thin film of metal on a substrate layer;
4 b. oxidizing said thin film of metal to form a first metal oxide lamination;
1 c. depositing a second sheet of metal on top of the first lamination;
2 d. oxidizing the second sheet of metal to form a second lamination; and
3 e. repeating steps c and d to fabricate a multilayer laminated structure of a desired
4 thickness.

1 22. The method as recited in claim 21, wherein each lamination is formed of an oxide
2 of a metal selected from the group consisting of aluminum, silicon, chromium, and tantalum.

3

4 23. The method as recited in claim 21, wherein each lamination in the multilayer
5 structure is formed of a nitride of a metal selected from the group consisting of aluminum,
6 silicon, chromium and tantalum.

1 24. The method as recited in claim 21, wherein the multilayer laminated structure is
2 composed of approximately 5-10 laminations.

1 25. The method as recited in claim 24, wherein the preferred thickness of each
2 lamination is approximately 10Å to 50 Å.

1 26. The method as recited in claim 25, wherein the thickness of each lamination is
2 approximately 10 Å to 20 Å.

1 27. A magnetic head comprising:
2 a first magnetic shield and a second magnetic shield;
3 a sensor being disposed between said magnetic shields;
4 two electrical leads for supplying electrical current to said sensor, said leads
5 being disposed proximate to said sensor; and
6 gap insulation layers disposed between said magnetic shields and said sensor,
7 wherein at least one of said gap insulation layers has a first gap insulation portion and a second
8 gap insulation portion, and wherein said first gap insulation portion includes multilayered
9 laminations of insulation material that are disposed upon said electrical leads, and said second

10 gap insulation portion includes multilayer laminations of insulation material that are disposed
11 upon said sensor and upon said first gap insulation portion.

1 28. A magnetic head as recited in claim 27, wherein each lamination is formed of an
2 oxide of a metal selected from the group consisting of aluminum, silicon, chromium and
3 tantalum.

1 29. A magnetic head as recited in claim 27, wherein each lamination is formed of a
2 nitride of a metal selected from the group consisting of aluminum, silicon, chromium and
3 tantalum.

1 30. A magnetic head as recited in claim 27, wherein the multilayered laminated
2 structures are each composed of approximately 5-10 laminations.

1 31. A magnetic head as recited in claim 27, wherein the thickness of each lamination
2 is approximately 10 Å to 50 Å.

1 32. A magnetic head as recited in claim 27, wherein the thickness of each lamination
2 is in the preferred range of approximately 10 Å to 20 Å.

1 33. A magnetic head as recited in claim 27, wherein the spacing between the first
2 magnetic shield layer and a portion of the second magnetic shield layer located proximate to said
3 sensor is approximately 1000 Å.

1 34. A magnetic head as recited in claim 33, wherein the spacing between the first
2 magnetic shield and the sensor is approximately 50 Å - 500 Å.

1 35. A magnetic head as recited in claim 34, wherein the spacing between said sensor
2 and the portion of said magnetic shield layer located proximate to said sensor is approximately
3 50 Å - 500 Å.

1 36. A magnetic head as recited in claim 27, wherein the spacing between said sensor
2 and the portion of the magnetic shield layer located proximate to said sensor is approximately
3 250 Å.

1 37. A method for fabricating a magnetic head, said method comprising:
2 depositing a first magnetic shield layer upon a wafer substrate;
3 depositing a first gap insulation layer upon a magnetic shield layer;
4 fabricating a sensor upon said gap layer;
5 fabricating the electrical leads proximate to said sensor, said leads providing
6 electrical current to said sensor;
7 fabricating a second gap insulation layer upon said electrical leads and said
8 sensor, said second gap insulation layer including a first gap insulation layer portion and a
9 second gap insulation layer portion, and wherein said first and second gap insulation layer
10 portions are made up of a plurality of multilayered laminations; and
11 fabricating a second magnetic shield upon said second gap insulation layer.

1 38. A method according to claim 37, wherein the step of fabricating said second gap
2 insulation layer includes the substeps of:

- 3 a. depositing a thin film of metal on a substrate layer;
4 b. oxidizing said thin film of metal to form a first metal oxide lamination;
1 c. depositing a second sheet of metal on top of the first lamination;
2 d. oxidizing the second sheet of metal to form a second lamination; and
3 e. repeating steps c and d to achieve a multilayer laminated structure of a desired
4 thickness.

1 39. The method as recited in claim 38, wherein each lamination in the multilayer
2 structure is formed of an oxide of a metal selected from the group consisting of aluminum,
3 silicon, chromium, and tantalum.

1 40. The method as recited in claim 38, wherein each lamination in the multilayer
2 structure is formed of a nitride of a metal selected from the group consisting of aluminum,
3 silicon, chromium and tantalum.

1 41. The method as recited in claim 38, wherein the multilayer structure is composed
2 of approximately 5-10 laminations.

1 42. The method as recited in claim 38, wherein the thickness of each lamination is
2 approximately 10Å to 50 Å.

1 43. The method as recited in claim 38, wherein the preferred thickness of each
2 lamination is approximately 10 Å to 20 Å